

# **Thermal Barrier Coating Workshop**

*Proceedings of a conference held at  
NASA Lewis Research Center  
Cleveland, Ohio  
March 27-29, 1995*





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## Foreword

Thermal barrier coatings (TBCs) were first used in relatively minor roles in aircraft turbine engines over 30 years ago. The early success and high potential benefits of TBCs prompted continuing development for more challenging applications. Recent TBC successes in high pressure turbine blade applications has led to the recognition that TBC coated superalloys offer the most viable materials solution to both near term and longer term engine challenges. Consequently, there has been a tremendous recent increase in the research and development activities associated with TBC use in turbines. Research and development of TBCs for diesel engine applications was initiated relatively recently for development of a low heat rejection engine. While this concept has met with limited success, diesel engine TBC research has been redirected toward increasing the durability of critical components while continuing the use of low cost base materials.

The recent emphasis on TBCs has highlighted the fact that TBC behavior is not well understood. For instance, knowledge of the most important issues, durability and failure mechanisms, is primarily at an empirical level. Similarly, the physical, mechanical and thermal properties of TBCs have not been adequately characterized. Consequently, design tools for TBCs and the life prediction capabilities required for critical components tend to be empirical in nature and application specific, rather than comprehensive. Furthermore, the lack of solid information on TBC performance has led to a significant amount of TBC "folk lore" that can be misleading. The goals of the Thermal Barrier Coating Workshop were to assess the state of TBC knowledge and identify critical gaps in the knowledge that hinder use in advanced applications. Perhaps more importantly, it was hoped that the Workshop would open a dialogue on TBCs that would allow exchange of factual information and more rapid advances in the field. These goals were addressed through presentations on topics ranging from defining the need for thermal barrier coatings to the design of future coatings. The participation of the 22 speakers and 200 attendees in wide ranging discussion sessions helped to provide a multifaceted view of the issues. This proceedings contains papers for 19 of the 22 presentations at the Workshop.

William J. Brindley  
Chairman TBC Workshop

### TBC Workshop Organizing Committee

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